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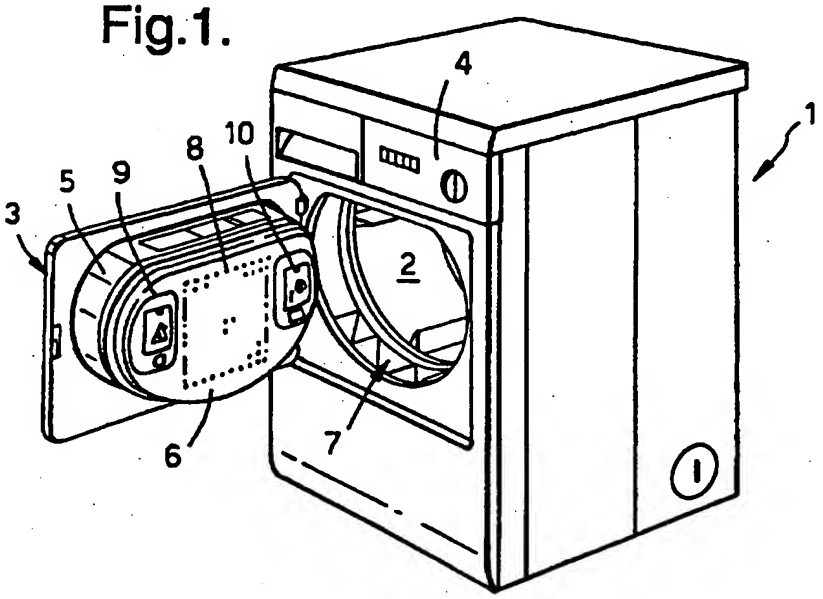
(54) Abstract Title
Rotary drum drier with door having a dispenser containing co-adjuvant substances

(57) A drier comprises a rotary drum (2) with a horizontal axis and a loading door (3) having an inner door (5) projecting towards the interior of the drum (2). The inner door (5) has holes (8) for the passage of drying air. Adjacent to the holes (8), there is a first dispensing device (10) which dispenses during the drying cycle a predetermined amount of co-adjuvant liquid or powder, such as deodoriser or fabric conditioner, which mixes with the hot drying air. Preferably the door (3) has a second device (9) adjacent to the air holes (8) for manually dispensing a second liquid co-adjuvant substance directly onto selected points of a fabric article when the door (3) is open.

Fig.1.



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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

Fig.2.

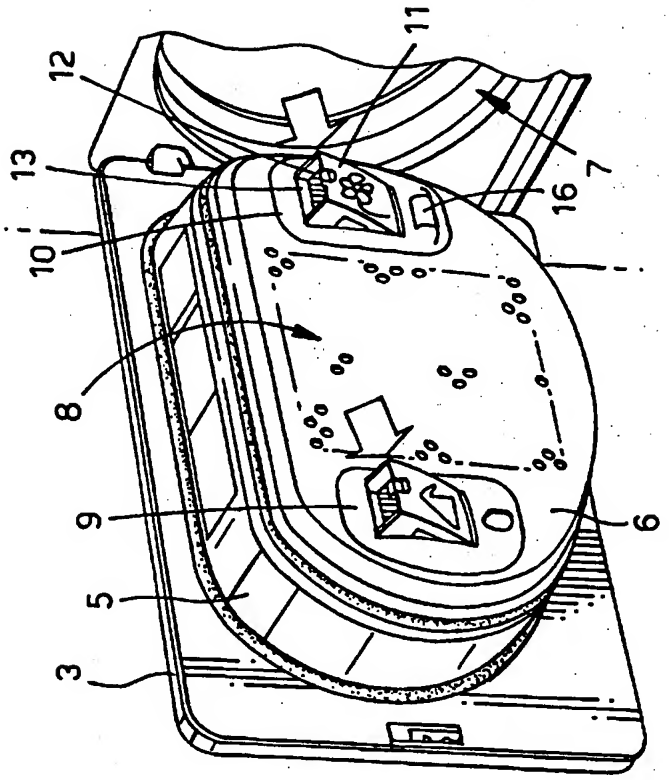


Fig.1.

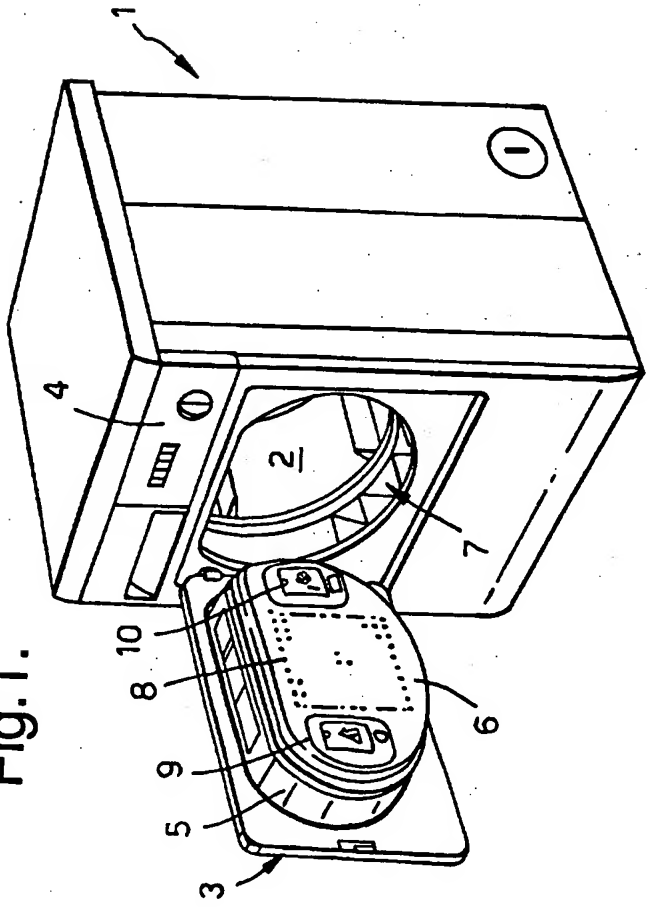
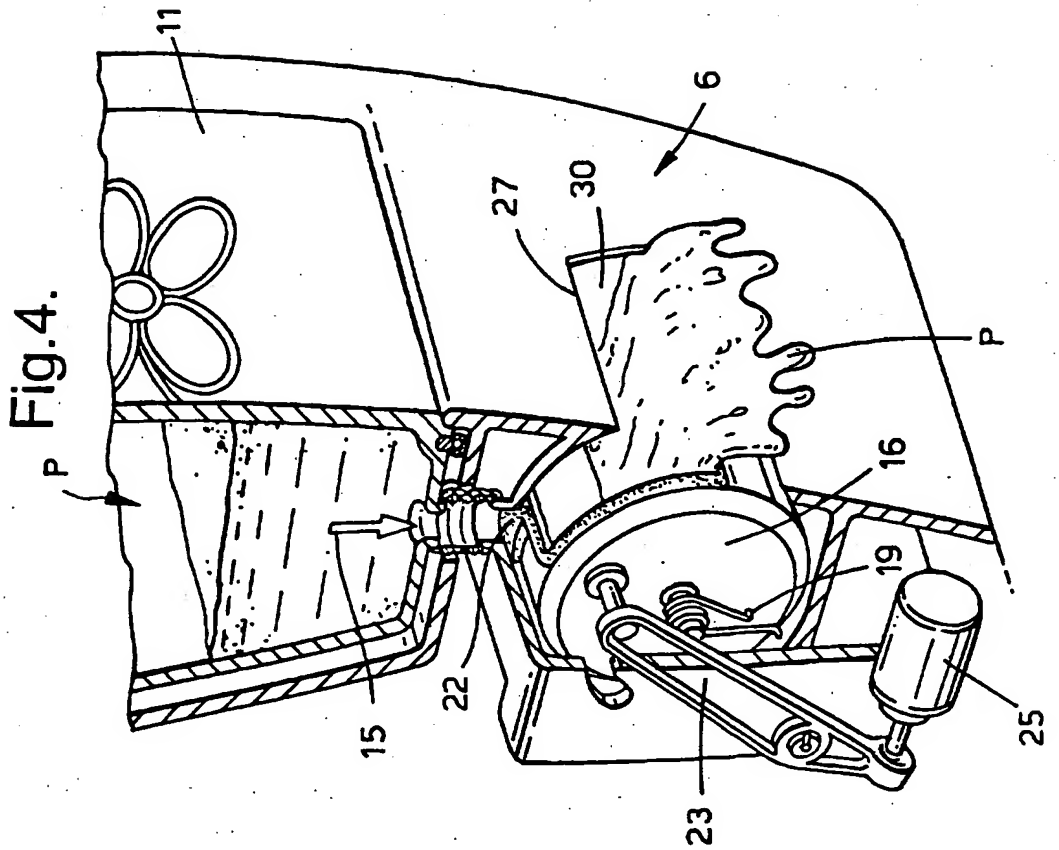


Fig.4.


11
6
27
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P
16
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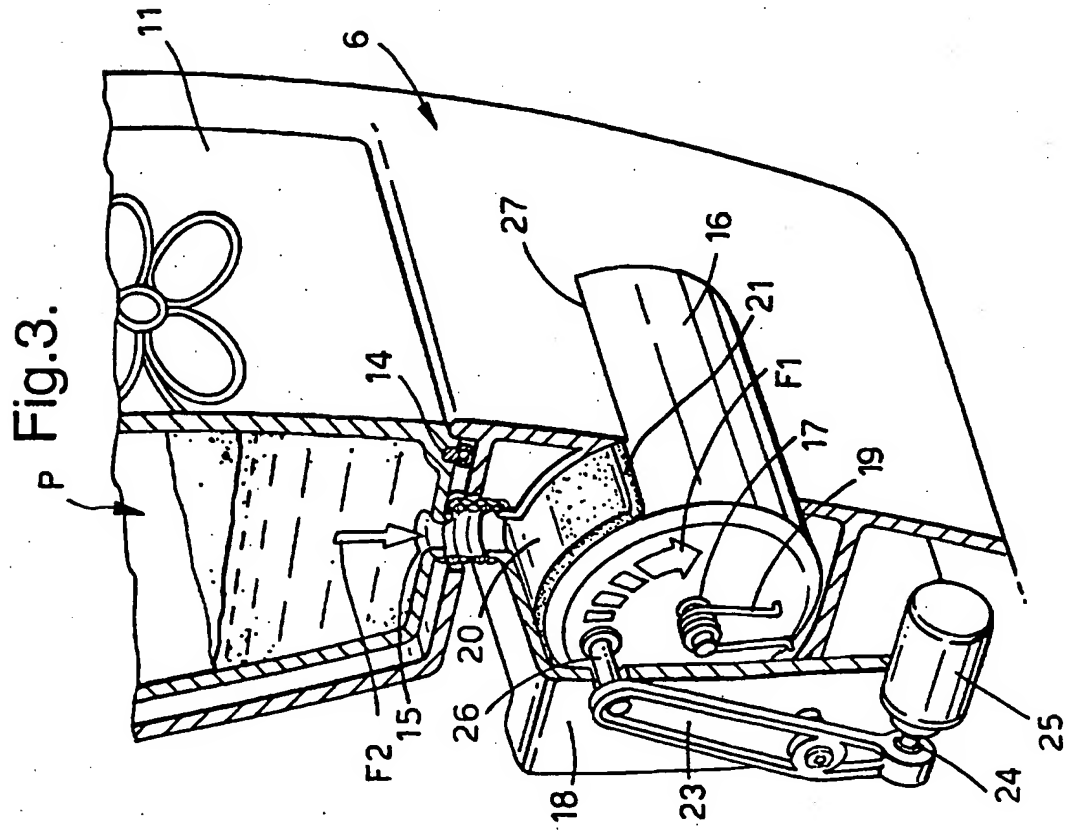
23

Fig.3.


11
6
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16
21
F1
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F2
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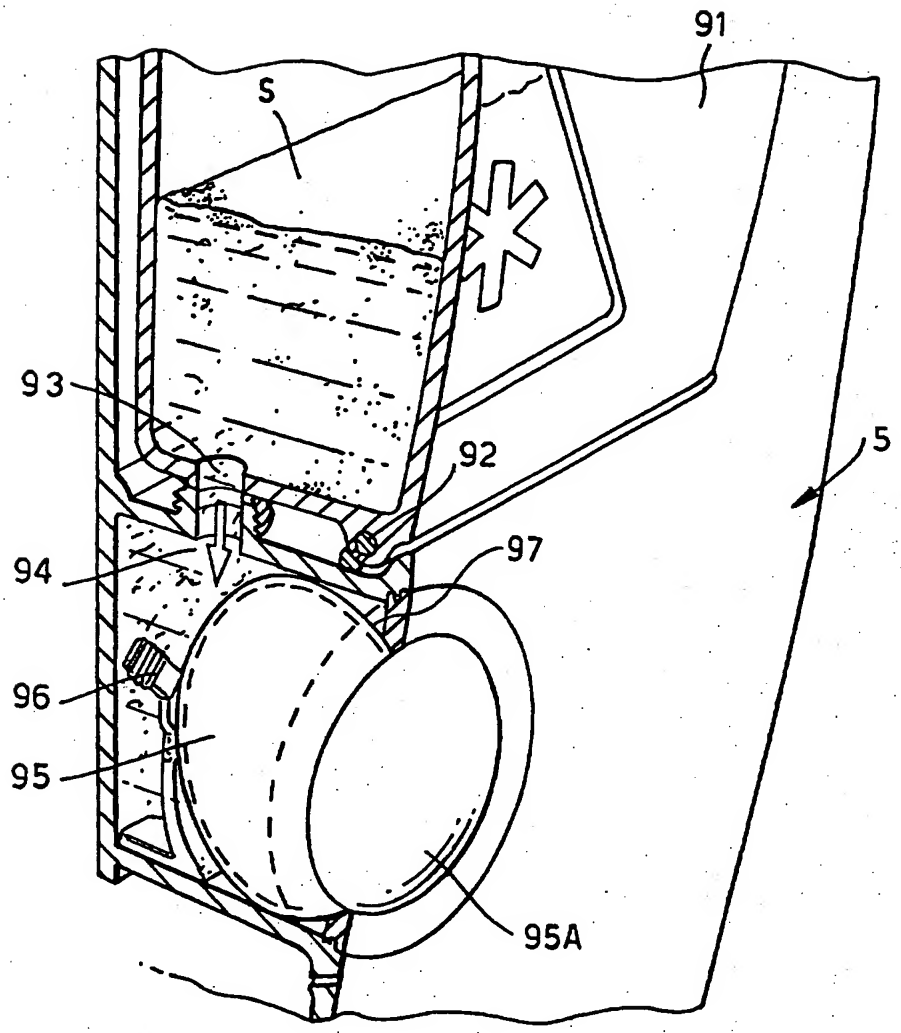
Fig.5.



ROTARY DRUM DRIER
WITH MEANS FOR DISPENSING CO-ADJUVANT SUBSTANCES

The present invention relates to rotary drum driers (the term which is used herein for also embracing similar appliances such as washing-drying machines), in particular but not only for domestic use.

It is known for fragrancy, softening, deodorising or stain-removal substances, which are referred to generally as co-adjuvant substances, to be added to the heated air which passes through the drum of a drier for the purposes of improving the treatment of the articles to be dried.

In US-A-4 170 678 the dispensing means is a non-fabric, initially multi-layer substrate soaked with an amount of a softening substance which is sufficient for several drying cycles. After each cycle the user modifies the substrate by pulling away the most outward layer in such a fashion that the subjacent layer is in turn exposed to the drying air and the softening substance contained therein can be transferred to the fabric articles to be dried which are loaded into the drum of the drier. It will be appreciated that, if the user does not remember to carry out the above-mentioned operation, the solution described in that document is not effective.

US-A-5 276 979 which is specifically directed to drying shoes in a drum drier provides for dispensing a deodorising powder from a container with a pierced stopper which forms part of a support in the form of a tubular sleeve with which there is fixed to the drum a tubular net or mesh which retains the shoes. Apart from the limitation in terms of use, this solution does not permit effective control of the release of the co-adjuvant substance.

It should finally be noted that specific solutions relating to the use of stain-removal substances are not known.

It would be desirable, and this is indeed a primary aim of the present invention, to be able to dispense in a controlled fashion the co-adjuvant substances in the rotary drum to use thereof a metered quantity at predetermined times in the drying cycle.

Another aim is to provide a drier having means which are particularly practical in use and which make it possible to use stain-removal substances and to apply same just to the points of a garment which require a treatment of that kind.

According to the present invention there is provided a drier or similar appliance comprising a substantially parallelepipedic casing, a rotary drum with an axis which is more or less horizontal, means for generating and maintaining a forced flow of hot air in the drum, control members and a loading door having an inner door which is capable of projecting towards the interior of the drum and is provided with a plurality of holes for the drying air to pass therethrough, wherein provided on the door adjacent to said holes is at least one first device capable of dispensing during the drying cycle a predetermined amount of a first co-adjuvant liquid and/or powder substance capable of mixing with the hot air.

The invention will be further described by way of non-limitative example with reference to the accompanying drawings, in which:-

Figure 1 is a three-dimensional view of a drier according to the invention with the front door for loading the rotary drum in the open position,

Figure 2 shows a view on an enlarged scale of the door in the open position,

Figures 3 and 4 show in two different configurations some functional details of the drier in partly sectional three-dimensional views of the door, and

Figure 5 is similar to Figures 3 and 4 and shows other functional details.

A drier comprises a substantially parallelepipedic casing 1, a rotary drum 2 which rotates with its axis more or less horizontal, a loading door 3 which is hinged vertically to the front wall of the casing 1, below a panel with the control members 4 - see Figure 1.

The inner door 5 is of a projecting shape, roughly cylindrical, with a front surface 6 which, when the door is in the closure position, is capable of projecting inwardly of the drum 2, by way of the opening 7 which accommodates a filter for the fluff entrained by the drying air which flows within the drum 2.

Disposed within the casing 1 are means for generating and maintaining a flow of heated air for heating the articles which are loaded into the drum 2. Such means which are known per se are not shown, except for a plurality of holes 8 in the central region of the front surface 6 of the inner door 5, in front of a motor-driven fan (not shown) which is connected into circuit with the interior of the inner door.

In accordance with the invention, accommodated in the interior of the inner door 5 at the two sides of the holes 8 there are also two devices, indicated by

reference numerals 9 and 10, which are respectively capable of controlledly releasing first co-adjuvant substances (for example a fragrancy or deodorising essence) into the flow of drying air, and permitting manual application of other substances (stain removers) directly to the points of the fabric articles which need to be dry-cleaned.

The device 10 (which is shown in Figures 3 and 4 in section in a vertical plane in two different configurations, as will be better described hereinafter), comprises a prismatic pivoting container or basin 11 for containing a sufficient quantity for several drying cycles of a first co- adjuvant substance in liquid or powder form. The container 11 comprises a horizontal fixing pin 14 for fixing to the front surface 6 of the inner door 5, a handle 12, a slotted mouth opening 13 and a hole 15 in the bottom.

Within the inner door, below the container 11, there is accommodated a cylindrical dispensing casing 16 with fixing pins (of which Figures 3 and 4 show only that on the left-hand side, identified by reference numeral 17) for fixing to the internal structure 18 of the inner door 5 and torsion springs 19. The surface of the casing 16 has a rectangular opening 20 surrounded by a resilient seal 21 having a projection 22 - see Figure 4. A lever 23 which is pivoted to the structure 18 is connected at the lower end to the rod 24 of a fluid-expansion actuator 25 and at the upper end to a pin 26 which is fixed with respect to the casing 16. In front of the casing 16 the front surface 6 of the inner door 5 has an opening 27 through which a part of the lateral surface of the casing 16 passes. The dispensing device 10 may obviously also comprise visual means (apertures, peep-holes or the like) for indicating to the user when the container 11 is empty.

With particular reference to dispensing the first co-adjuvant substances from the device 10, the mode of operation involved is as follows, assuming that when the drier is not in operation in the dispensing device 10 the container 11 is closed and its hole 15 is aligned with the opening 20 in the subjacent casing 16 - see Figure 3

First of all, after the articles to be dried have been loaded into the drum 2, the user opens the container 11 by pulling on the handle 12 to rotate it about the pin 14 and by way of the mouth opening 13 the user fills the container 11 with the preferred co-adjuvant substance as indicated at P in Figures 3 and 4 (for example a liquid scented essence). In that way the casing 16 is also filled.

Finally the container 11 is closed again, like the door 3.

The drying cycle can thus be started by means of the control members 4 which apply voltage to the motor-driven fan and the heating elements to create a closed flow of hot air which passes through the drum and also comprises the holes 9 at the front surface 6 of the inner door 5 and the filter positioned at the opening 7.

As the temperature of the drying air increases the fluid contained in the actuator 25 moves the rod 24 and, by virtue of the action of the lever 23, the casing 16 is caused to rotate about the pin 17 in the direction of the arrow F1, assuming that the configuration is one in which the opening 20 in the casing 16 is increasingly opened until the hole 15 in the container 11 is closed by the projection 22 of the seal 21. In that way the substance P is poured into the drum 2 by way of the opening 27 in the front surface 6 of the inner door 5 and mixed with the hot air which is passing through the holes 8 which are adjacent to the device 10 - see Figures 2 and 4. The articles which are loaded in the drum 2 are thus scented and/or deodorised during the drying cycle.

At the end of the drying cycle the temperature of the air falls due to deactivation of the heating elements of the drier and the rod 24 of the actuator 25 retracts under the thrust force of the spring 19 which causes the casing 16 to rotate in the opposite direction to the arrow F1 until the device 10 returns to its initial configuration.

In turn - see Figure 5 - the second device 9 also comprises a prismatic pivoting container 91 which however can be filled by the user with a second co- adjuvant substance which is a stain-removing or dry-cleaning liquid S. The casing 91 has a horizontal pin 92 and a hole 93 in its bottom, as well as a handle and a slotted opening.

Below the container 91 the device 9 comprises a hollow spherical body 95 of which a large part is accommodated in a space 94 in the interior of the inner door 5 and a minor part 95A is projecting towards the interior of the drum 2 through an opening 97 in the front surface 6 of the inner door 5. Due to the effect of the thrust force of a return spring 96 the spherical body 95 is free to rotate in all directions while its surface, even where it corresponds to the projecting part 95A, is kept moist by the liquid S which falls from the hole 93 and fills the space 94.

When the drier is not in operation and the door 3 is open, it is thus possible for the user to remove stains from any fabric article by manually rubbing it against the surface which is wetted with the stain-removing liquid S of the projecting part 95A of the spherical body 95.

The advantages of the invention can be summarised in the following terms:

a) Use of the co-adjuvant substances is well controlled insofar as the amount of the substance P dispensed by the device 10 depends on the temperature of the drying air (which can be for example varied by means of the control members 4 of the drier) and the amount of the substance S taken from the device 9 is obviously a function of manual rubbing against the spherical body 95.

b) Use of the devices 9 and 10 is something that any user can easily understand and implement, because also they are on the inner door 5, in an easily accessible position.

c) The capacity of the devices 9 and 10, that is to say the amount of co-adjuvant substances which can be loaded into the respective containers 91 and 11, is enough for several drying cycles.

d) The devices 9 and 10 do not require electrical power cables and therefore any risk of overheating or the like is to be excluded.

It will be appreciated that further modifications in the present invention which are protected by the present patent may be developed by the men skilled in the art, for example a drier with a top loading door.

CLAIMS

1. A drier or similar appliance comprising a substantially parallelepipedic casing, a rotary drum with an axis which is more or less horizontal, means for generating and maintaining a forced flow of hot air in the drum, control members and a loading door having an inner door which is capable of projecting towards the interior of the drum and is provided with a plurality of holes for the drying air to pass therethrough, wherein provided on the door adjacent to said holes is at least one first device capable of dispensing during the drying cycle a predetermined amount of a first co-adjuvant liquid and/or powder substance capable of mixing with the hot air.

2. A drier according to claim 1 wherein said first device comprises a preferably multi-dose container for the first co- adjuvant substance, which can be filled by the user, a dispensing casing and means which are capable of selectively communicating the casing with the container and with the interior of the rotary drum by way of openings in the container and the inner door respectively.

3. A drier according to claim 2 wherein the means which are capable of communicating the casing with the interior of the rotary drum consist of a fluid-expansion actuator and the means which are capable of communicating the container with the casing consist of at least one torsion spring.

4. A drier according to claim 2 or claim 3 wherein the container is pivoting about a pin and is provided with a handle to make the opening accessible to the user from the front surface of the inner door to load said first co-adjuvant substance .

5. A drier according to either one of claims 3 and 4 characterised in that the dispensing casing is supported by the internal structure of the inner door and is provided on its lateral surface with an opening which in turn is capable of being selectively communicated with the container and with the interior of the rotary drum.

6. A drier according to claim 5 wherein said opening of the dispensing casing is surrounded by a resilient sealing member having a projection.

7. A drier according to any one of the preceding claims and which is provided on the door adjacent to the air passage holes with a second device capable of manually dispensing, when the drier is stopped and with the door open, a second liquid co-adjuvant substance directly on to selected points of a fabric article.

8. A drier according to claim 7 wherein said second device comprises a preferably multi-dose container for the second co- adjuvant substance, which can be filled by the user, and a subjacent rolling body, a part of which projects from the inner door towards the interior of the drum in such a way that it can be rubbed against said selected points of a fabric article.

9. A drier substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

Application No: GB 9930029.5
Claims searched: 1 to 9

Examiner: T P Marlow
Date of search: 7 June 2000

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): F4G: (GCAB) (GCCE) (GCCX) (GCRB) (GCRC) (GCRX)

Int Cl (Ed.7): D06F: 58/00, 58/02, 58/04, 58/20, 58/28 F26B: 11/04

Other: ONLINE: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 2231944 A	SANYO - see figures 2 to 5; porous member (39) serves as container for agent (e.g. static electricity erasing or aromatic) with slits (42b) in mounting portion (37) for passage of drying air to agent as described on pages 8 to 13	1,2
A	US 4053992	FURGAL - see dispensing means (25) in door (17) in figures 1 and 2	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.